

TITLE

ELECTRO PHOTO MULTI FUNCTIONAL PERIPHERAL APPARATUS

CLAIM OF PRIORITY

This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from my application *ELECTRO PHOTO MULTI FUNCTIONAL PERIPHERAL APPARATUS* filed with the Korean Industrial Property Office on 24 June 1999 and there duly assigned Serial No. 23879/1999.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an electro photo multi functional peripheral apparatus, more particularly, to an electro photo multi functional peripheral apparatus which has various paper transport paths and allows a jammed paper sheet to be easily removed.

Description of the Related Art

Generally, in order to perform various functions, an electro photo multi

1 functional peripheral apparatus includes various separate optional auxiliary devices
2 such as a sorter, a power stacker and a large scale paper feeding unit, and also has
3 various types of paper transport paths to effectively feed recording papers.

4 Fig. 1 is a schematic view showing a L-type paper transport path of a
5 conventional electro photo multi functional peripheral apparatus. ¹⁺it is advantageous
6 that the entire length of the L-type paper transport path be short. However, if an
7 optional auxiliary device 2 such as a power stacker is mounted, since the paper
8 transport path is leaned to a left side of a main body 1, optional auxiliary device 2 is
9 overlapped with a feeding unit 3. Therefore, it is difficult or impossible to use the
10 optional device and the feeding unit at the same time. Thus, there is a disadvantage
11 in an expansibility of the optional device.

12 Fig. 2 is a schematic view showing a S-type paper transport path of a
13 conventional electro photo multi functional peripheral apparatus. In this type, a
14 separate rack is needed to mount optional auxiliary device 2.

15 In the conventional electro photo multi functional peripheral apparatus as
16 disclosed above, since it is not easy to use optional auxiliary device 2, the reliability
17 of the apparatus is lowered. Further, since the entire paper transport path is located
18 in main body 1, it is not easy to remove a jammed paper sheet.

1 Particularly, when a paper jam occurs, it is very complicated to remove the
2 jammed paper sheet. First, a top cover 4 is opened and a developer 5 is taken out of
3 the main body. Then, the jammed paper sheet is removed. After that, the developer
4 is received again in the main body and the top cover is closed. Further, in case the
5 jammed paper sheet is mechanically caught by a roller, it is very difficult to remove
6 the jammed paper sheet, since the jammed paper sheet is crumpled or torn.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide an electro photo
multi functional peripheral apparatus which has various paper transport paths so as
to increase the expansibility of an optional device.

7 Another object of the present invention is to provide an electro photo multi
8 functional peripheral apparatus which allows a jammed paper sheet to be easily
9 removed.
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14 In order to accomplish the above object, the present invention provides an
15 electro photo multi functional peripheral apparatus comprising a main body which is
16 provided with an optional auxiliary device such as a sorter, a power stacker or a large
17 scale paper feeding unit located at one side thereof. A feeding unit for feeding sheet

1 of recording paper is mounted at the other side of the main body. A feeding cassette
2 is mounted at a lower portion of the main body. A multipurpose feeding unit
3 assembly is removably mounted at a center portion of the main body and horizontally
4 transports the recording paper fed from the feeding unit. The main body is formed
5 with a first, a second, and a third paper transport paths for discharging the recording
6 paper fed from the optional device.

7 In another aspect of the present invention, there is provided an electro photo
8 multi functional peripheral apparatus comprising a main body having an optional
9 device such as a sorter, a power stacker, a large scale paper feeding unit and a
10 multipurpose feeding unit at one side thereof. A feeding unit for feeding a recording
11 paper is mounted at the other side of the main body. A multipurpose feeding unit
12 assembly is removably mounted at a center portion of the main body and horizontally
13 transports the recording paper fed from the feeding unit. The multipurpose feeding
14 unit assembly comprises a jammed paper removing means for easily removing a
15 jammed paper.

16 Preferably, the multipurpose feeding unit assembly comprises a rectangular
17 base member. At least one or more cover plates are mounted on an upper face of the
18 base member, paper feeding means for feeding the recording paper is mounted at the

1 base member and the cover plate. A power transmitting means transmits power to the
2 paper feeding means. A guiding means guides a backward and forward movement
3 of the multipurpose feeding unit assembly.

4 Preferably, the paper feeding means comprises a plurality of feeding roller
5 which are mounted at an interval on a rear side of the base member and are rotated
6 by the power transmitting means. A plurality of pinch rollers are rotatably mounted
7 at the cover plates, so as to be respectively opposite to the feeding rollers.

8 Preferably, the jammed paper removing means is composed so that one of the
9 cover plates is formed to be revolved with a hinge shaft in the center and an elastic
10 member is provided between the cover plate and the base member.

11 Preferably, the guiding means comprises guiding rollers which are rotatably
12 mounted at both sides of the base member.

13 Preferably, the electro photo multi functional peripheral apparatus further
14 comprises a front cover which is fixed to a front face of the base member. The front
15 cover has a grasping groove at a center portion thereof to facilitate operation of
16 receiving and withdrawing the multipurpose feeding unit assembly, by the grasping
17 groove.

18 Preferably, the electro photo multi functional peripheral apparatus further

1 comprises a plurality of position guiding members, which are fixed to a rear side of
2 the base member, and a plurality of position guiding holes, which are formed at an
3 inner portion of the main body. The position guiding members are respectively
4 inserted therein.

5 BRIEF DESCRIPTION OF THE DRAWINGS

6 A more complete appreciation of the invention, and many of the attendant
advantages, thereof, will be readily apparent as the same becomes better understood
by reference to the following detailed description when considered in conjunction
with the accompanying drawings in which like reference symbols indicate the same
or similar components, wherein:

Fig. 1 is a schematic view showing a L-type paper transport path of a
conventional electro photo multi functional peripheral apparatus.

Fig. 2 is a schematic view showing a S-type paper transport path of a
conventional electro photo multi functional peripheral apparatus.

Fig. 3 is a schematic view showing a structure of an electro photo multi
functional peripheral apparatus according to the present invention.

Fig. 4 is a schematic view of an embodiment of the electro photo multi

functional peripheral apparatus according to the present invention.

Fig. 5 is a perspective view of a multipurpose feeding unit assembly of the electro photo multi functional peripheral apparatus according to the present invention.

Fig. 6 is a plan view of the multipurpose feeding unit assembly of the electro photo multi functional peripheral apparatus according to the present invention.

Fig. 7 is a cross sectional view taken along a line VII-VII of Fig. 6.

Fig. 8 is a cross sectional view taken along a line VIII-VIII of Fig. 6.

Fig. 9 is a front view showing a state that cover plate is closed in order to explain an operation of removing a jammed paper sheet.

Fig. 10 is a front view showing a state that cover plate is closed in order to explain an operation of removing a jammed paper sheet.

Fig. 11 is an enlarged view of a C portion of Fig. 4.

Fig. 12 is an enlarged view of a D portion of Fig. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following, a preferred embodiment of the present invention is described in detail with reference to Figs. 1 to 5.

1 Fig. 1 is a schematic view showing a L-type paper transport path of a
2 conventional electro photo multi functional peripheral apparatus. Fig. 2 is a
3 schematic view showing a S-type paper transport path of the conventional electro
4 photo multi functional peripheral apparatus. In this type, a separate rack is needed to
5 mount an optional device 2, such as a scanner.

6 In the conventional electro photo multi functional peripheral apparatus as
disclosed above, since it is not easy to use optional device 2, the reliability of the
apparatus is lowered. Further, since all of the paper transport path are formed in main
body 1, it is not easy to remove a jammed paper sheet when a paper sheet is jammed.

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14 Fig. 3 is a schematic view showing a structure of an electro photo multi
functional peripheral apparatus according to the present invention. As shown in Fig.
15 3, the electro photo multi functional peripheral apparatus according to the present
invention is provided with a separate receiving space 11 at a center portion of a main
16 body 10. A separate multipurpose feeding unit assembly 20 for horizontally
17 transporting a paper sheet is removably mounted in receiving space 11. Therefore,
18 when a paper jam occurred in multipurpose feeding unit assembly 20, the jammed
paper sheet can be easily removed. The electro photo multi functional peripheral
apparatus has a simple structure to secure the expansibility of the optional device and

1 be facile to remove the jammed paper sheet.

2 The L type paper transport path in Fig. 1 is used here as a basic design.
3 Multipurpose feeding unit assembly 20 is mounted at the center portion of main body
4 10, whereby an entire structure of the paper transport path is formed into the S type.

5 An optional device 12 is mounted at one side of main body 10. A feeding unit
6 13 is mounted at the other side of main body 10. A paper sheets fed from feeding unit
7 13 is horizontally transported along multipurpose feeding unit assembly 20 and then
8 discharged along an upper side of main body 10. Further, if necessary, a large scale
9 cassette 14 is mounted at the side of main body 10, so that the paper sheet can be fed
10 to multipurpose feeding unit assembly 20. Alternatively, the paper sheet can be fed
11 from a feeding cassette 15 located at a lower portion of main body 10 and vertically
12 transported and then discharged, whereby the paper transport path can be formed into
13 various types.

14 In an embodiment of the electro photo multi functional peripheral apparatus
15 of the present invention, as shown in Fig. 4, a duplex module 12' as one of the
16 optional device may be mounted at one side of main body 10. Duplex module 12'
17 uprightly feeds a recording paper from an upper portion of the main body 10.

18 ~~Duplex module 12' may be removably mounted at main body 10 or fixedly~~

1 mounted at main body 10. In the following embodiment of the present invention
2 duplex module 12' is attached at the main body 10. As shown in Figs. 5 to 10,
3 multipurpose feeding unit assembly 20 comprises a rectangular base member 21. A
4 guiding means is disposed at a portion of base member 21 and guides a backward and
5 forward movement of multipurpose feeding unit assembly 20. A front cover 22 is
6 fixed to a front face of base member 21. At least one cover plate 23 is mounted on
7 an upper face of base member 21. A paper feeding means is mounted at base member
8 21 and cover plate 23. A power transmitting means transmits power to the paper
9 feeding means. A jammed paper removing means easily removes a jammed paper
10 sheet when a paper sheet is jammed.

11 In addition, bent-down portions 24 and 25 are respectively formed at both side
12 ends of base member 21. Guiding rollers 26 and 27 are rotatably mounted at the
13 insides of bent-down portions 24 and 25. Guiding rollers 26 and 27 are rotatably
14 supported by supporting shafts 28 and 29. Multipurpose feeding unit assembly 20
15 can be moved backward and forward by guiding rollers 26 and 27, so as to be
16 slidingly received in receiving space 11 of main body 10.

17 A grasping groove 22a is formed at a center portion of front cover 22.
18 Therefore, operation of receiving and withdrawing multipurpose feeding unit

1 assembly 20 is easily performed by grasping groove 22a.

2 Cover plates 23 and 23' are mounted on the upper face of base member 21 so
3 as to have a desired height difference between cover plates 23 and 23'. Base member
4 21 transports the recording paper therebetween. A paper feeding means is provided
5 at each of base member 21 and the cover plates 23 and 23'.

6 A plurality of roller shafts 31 and 32 are rotatably supported at an interval on
7 a rear side of base member 21. A plurality of feeding rollers 41 and 42 are
8 respectively fixed to roller shafts 31 and 32. Feeding rollers 41 and 42 are outwardly
9 protruded through openings 21b formed on base member 21.

10 A plurality of pinch rollers 51 and 52 are rotatably mounted at a bottom face
11 of cover plates 23 and 23' by supporting means such as brackets, etc. so as to be
12 opposite to feeding rollers 41 and 42 of base member 21. Pinch rollers 51 and 52 are
13 closely contacted with feeding rollers 41 and 42 so as to be rotated by rotational
14 operations of feeding rollers 41 and 42 and feed the recording papers. Pinch rollers
15 51 and 52 are slightly protruded outwardly through openings 23a and 23a' formed on
16 cover plates 23 and 23'.

17 The power transmitting means comprises pulleys 61 and 62 which are fixedly
18 coupled to each end of roller shafts 31 and 32 and belts 71 and 72 which connect

1 pulleys 61 and 62 with each other to transmit rotational power. A transmission gear
2 35 is fixed to outmost roller shaft 34 (or 31) out of roller shafts 31 and 32.
3 Transmission gear 35 is rotated by a power generating means such as a motor. Thus,
4 entire roller shafts 31 and 32 are rotated in a direction.

5 Transmission gear 35 is engaged with a gear receiving power from a power
6 generating means when multipurpose feeding unit assembly 20 is completely
7 received in receiving space 11.

8 A plurality of position guiding members 73 are fixed to a rear side of base
9 member 21. Position guiding members 73 are respectively inserted into position
10 guiding holes 74 formed at an inner portion of main body 10. Position guiding holes
11 74 precisely guide the position of multipurpose feeding unit assembly 20 and prevent
12 multipurpose feeding unit assembly 20 received in receiving space 11 from being
13 arbitrarily moved forward.

14 The jammed paper removing means is so constructed that a one of cover plates
15 23 and 23' is formed to be revolved with a hinge shaft 81 in the center and an elastic
16 member such as a tension coil spring is provided between cover plate 23 and base
17 member 21.

18 A grasping portion 83 is formed at an end of cover plate 23 so as to facilitate

1 an operation of opening cover plate 23. Grasping portion 83 is slightly bent upward.

2 The jammed paper removing means may be advantageously provided at the
3 other cover plate 23'.

4 Preferably, in order to prevent multipurpose feeding unit assembly 20 from
5 being completely withdrawn when multipurpose feeding unit assembly 20 is forward
6 moved to remove the jammed paper, a separate latching means is provided in
7 receiving space 11. For example, latching portions are respectively formed in each
8 portion of base member 21 and receiving space 11, so that multipurpose feeding unit
9 assembly 20 is caught by the latching portions when the withdrawing operation of
10 multipurpose feeding unit assembly 20 is completed.

11 Duplex module 12' is advantageously provided at one side of main body 10,
12 as shown in Fig. 11. The electro photo multi functional peripheral apparatus of the
13 present invention then further comprises a first guiding chute 91 and a second
14 guiding chute 92, which are mounted at an inside of main body 10. A first paper
15 transport path 93 guides a paper sheet fed from multipurpose feeding unit assembly
16 20. A second paper transport path 94 guides a paper sheet fed from feeding cassette
17 15. A third paper transport path 95 guides a paper sheet fed from duplex module 12'.

18 Further, as shown in Fig. 12, if large scale cassette 14 is used, paper sheets fed

1 from large scale cassette 14 are fed through a paper-receiving opening 96 formed in
2 a portion of main body 10 and then continuously fed along multipurpose feeding unit
3 assembly 20.

4 In the electro photo multi functional peripheral apparatus according to the
5 present invention as described above, separate multipurpose feeding unit assembly
6 20 is adapted to be received in receiving space 11 and used as a part of the paper
7 transport path. Therefore, if the recording paper fed from feeding unit 13 is entered
8 into multipurpose feeding unit assembly 20, feeding roller 41 and 42 and pinch roller
9 51 and 52 are rotated by the transmission means and transports the recording paper.
10 And then, the recording paper discharged to an outlet of the multipurpose feeding
11 unit assembly 20 is transported along first paper transport path 93 formed by second
12 guiding chute 92 to a predetermined location as shown in Fig. 11.

13 If separate large scale cassette 14 is used, as shown in Fig. 12, recording paper
14 fed from large scale cassette 14 enters through a paper-receiving opening 96, formed
15 in a portion of main body 10, and is then transported through the paper path, which
16 is the same in multipurpose feeding unit assembly 20, to first paper transport path 93.

17 If a feeding cassette mounted in main body 10 is used instead of large scale
18 cassette 14, the recording paper is transported through a second paper transport path

1 94 formed between first guiding chute 91 and second guiding chute 92. When duplex
2 module 12' is used, the recording paper is transported along a third paper transport
3 path 95 formed by first guiding chute 91 and second guiding chute 92.

4 If the recording paper is jammed in multipurpose feeding unit assembly 20,
5 first, a user pulls multipurpose feeding unit assembly 20 in a direction corresponding
6 to arrow E of Fig. 6. At this time, grasping groove 22a in front cover 22 assists in the
7 withdrawing operation of multipurpose feeding unit assembly 20. Then, after
8 multipurpose feeding unit assembly 20 is withdrawn by a desired length, the user
9 raises cover plate 23 upward. Cover plate 23 is then revolved with hinge shaft 81 in
10 the center, so that a portion between feeding rollers 41 and 42 and pinch rollers 51
11 and 52 is exposed to the outside. Therefore, the user can easily remove the jammed
12 paper.

13 After that, the user pushed multipurpose feeding unit assembly 20 in the
14 direction of arrow F of Fig. 6, so that multipurpose feeding unit assembly 20 is
15 received again in receiving space 11. When the receiving operation of multipurpose
16 feeding unit assembly 20 is completed, position guiding members 71 formed at the
17 rear side of multipurpose feeding unit assembly 20 are entered into position guiding
18 holes 74 formed at the inner portion of main body 10. Therefore, the position of the

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Cond* multipurpose feeding unit assembly 20 is exactly guided and prevented from being
arbitrarily moved forward.

3 While the invention has been described in connection with specific and
4 preferred embodiments thereof, it is capable of further modifications without
5 departing from the spirit and scope of the invention. This application is intended to
6 cover all variations, uses, or adaptations of the invention, following, in general, the
7 principles of the invention and including such departures from the present disclosure
8 as come within known or customary practice within the art to which the invention
9 pertains, or as are obvious to persons skilled in the art, at the time the departure is
10 made. It should be appreciated that the scope of this invention is not limited to the
11 detailed description of the invention hereinabove, which is intended merely to be
12 illustrative, but rather comprehends the subject matter defined by the following
13 claims.